THE CLAIMS

What is claimed is:

1. A method for forming a relaxed or pseudo-relaxed useful layer on a substrate which comprises:

growing a strained semiconductor layer on a donor substrate;

bonding a receiver substrate to the strained semiconductor layer by a vitreous layer of a material that becomes viscous above a certain viscosity temperature to form a first structure;

detaching the donor substrate from the first structure to form a second structure comprising the receiver substrate, the vitreous layer, and the strained layer; and

heat treating the second structure at a temperature and time sufficient to relax strains in the strained semiconductor layer and to form a relaxed or pseudo-relaxed useful layer on the receiver substrate.

2. The method of claim 1 wherein the vitreous layer is formed on the strained layer prior to bonding.

3. The method of claim 1 wherein the vitreous layer is formed on the receiver substrate prior to bonding.

4. The method of claim 1 wherein the second structure is heat treated at a temperature that is at least about the certain viscosity temperature.

5. The method of claim 4 wherein the vitreous layer is provided by growing a semiconductor material layer on the strained layer and applying a controlled treatment to convert at least part of the semiconductor material layer into a material which is viscous above the certain viscosity temperature.

6. The method of claim 5 wherein the semiconductor material layer comprises silicon, and the controlled treatment is a controlled thermal oxidation treatment that converts at least part of the silicon layer into a silicon oxide vitreous layer.

7. The method of claim 5 wherein the controlled treatment forms an inserted layer between the vitreous layer and the strained layer.

8. The method of claim 7 wherein the inserted layer becomes at least a partially strained layer after the heat treatment.

9. The method of claim 1 wherein the thickness of the vitreous layer in the first structure is about between 5Å and about 5000Å.

10. The method of claim 9 wherein the thickness of the vitreous layer is about between 100Å and about 1000Å.

11. The method of claim 1 which further comprises growing a strained semiconductor layer on the useful layer.

12. The method of claim 1 which further comprises applying a bonding layer of material onto at least one of the vitreous layer, the receiver substrate or the strained layer prior to the bonding step.

13. The method of claim 12 wherein the bonding layer comprises silicon oxide.

14. The method of claim 1 which further comprises providing a zone of weakness in the donor substrate so that the donor substrate can be detached along the zone of weakness.

15. The method of claim 14 wherein the donor substrate is fabricated by forming a porous layer on a crystalline carrier substrate and growing a crystalline layer on the porous layer, such that the porous layer comprises the zone of weakness of the donor substrate.

16. The method of claim 14 wherein the donor substrate is detached along the weakened zone by at least one of chemical etching or mechano-chemical etching.

17. The method of claim 14 wherein the zone of weakness is formed by implanting atomic species in the donor substrate.

18. The method of claim 14 wherein the donor substrate is detached along the zone of weakness to form a third structure comprising the receiver substrate, the vitreous layer, the strained layer and a layer of donor material, and wherein the layer of donor material is removed before heat treating the third structure.

19. The method of claim 1 wherein the vitreous layer is of an electrically insulating material.

20. The method of claim 1 wherein the vitreous layer comprises silicon oxide.

21. The method of claim 1 wherein the donor substrate comprises silicon and the strained layer is made of a $Si_{1-x}Ge_x$ material.

22. The method of claim 1 wherein the viscosity temperature of the vitreous layer is greater than about 900°C and the heat treating occurs at a temperature above about 900°C to about 1500°C.

23. The method of claim 1 further comprising fabricating optic, electronic or optoelectronic components in the useful layer.

24. The method of claim 11 further comprising fabricating optic, electronic or optoelectronic components in the strained semiconductor layer.